



Overview of Demand Response in PJM

Demand Response in Downtown D.C. A Workshop for Federal Facilities

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Susan Covino
Manager, Demand Side Response

- Emergency and Economic Load Response
- Recent PJM market experience of Curtailment Service Providers
- New DSR market initiatives
- Comparable treatment for Demand Resources and generation resources
- Importance of metering

Who Offers Load Response Programs?

- *Regional Transmission Organizations—Curtailment Service Providers aggregate load*
 - *Technology Companies*
 - *Electric Distribution Companies*
 - *Load Serving Entities*

Also, can be offered independently by the Electric Distribution Company or the Load Serving Entity



PJM Load Response Programs

EMERGENCY

Designed to provide a method by which end-use customers may be compensated by PJM for voluntarily reducing load during an emergency event.

ECONOMIC

Designed to provide an incentive to customers or curtailment service providers to reduce consumption when PJM LMP prices are high

EMERGENCY

PJM Emergency event
PJM posts Emergency
Message

ECONOMIC^{**}

Day Ahead Market

- Customer Submit Day Ahead Bid in eMKT
- PJM Notifies Customer via eMKT
- Obligated in Real Time if Bid clears

Real Time Market

- Customer Notifies PJM via email one hour prior to reduction
- Voluntary Curtailment

Dispatched by PJM in Real Time

- Customer Submits operational info via eSuites
- PJM Notifies Customer via phone

***Except Real Time LMP Based Customer*



Payment to Load Reducers

EMERGENCY

PJM pays higher of Zonal LMP or \$500/MWh
(participant's Minimum Dispatch Price will replace \$500/MWh effective June 1, 2006)

ECONOMIC **

If Zonal LMP < \$75/MWh,
•PJM pays Zonal LMP - Retail Rate
(Retail Rate = Generation + Transmission)

If Zonal LMP > = \$75/MWh,
•PJM pays Zonal LMP

***Except Real Time LMP Based Customer*



2005 Economic Demand Side Response Monthly Net CSP Credits

ZONE	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
AE	\$1,316					\$373	\$202,529	\$99,852					
AEP						\$13,548	\$62,126	\$28,931					
APS	\$230,431					\$168,362	\$681,722	\$271,530	\$846,665	\$470,474	\$262,558	\$234,954	
BGE						\$94,966	\$403,816	\$642,296	\$101,366	\$102,989		\$396,769	
COMED							\$82	\$2,135	\$2,596	\$500			
DLCO								\$159,838					
DOM								\$35,452					
DPL	\$35,959		\$22,058	\$927		\$96,613	\$837,362	\$1,807,763	\$1,818,133	\$661,427	\$19,123	\$24,726	
JCPL						\$2,393	\$6,784						
METED	\$2,585	\$293	\$5,357	\$1,647		\$9,215	\$15,734	\$531	\$1,196				
PECO			\$101			\$40,539	\$90,659	\$62,379	\$11,771	\$18,871	\$1,072	\$107	
PENELEC								\$1,503	\$2,192				
PPL	\$224	\$13,095			\$54,666	\$173,405	\$17,582	\$32,917	\$5,682		\$79,063	\$32,469	
PSEG						\$9,280	\$48,893	\$47,662	\$45,457	\$17,052	\$19,331	\$70,362	
RECO								\$18	\$308				
Total	\$270,513	\$13,389	\$27,517	\$2,574	\$54,666	\$608,693	\$2,367,288	\$3,192,806	\$2,835,366	\$1,271,314	\$381,147	\$759,387	\$11,784,659



2005 Economic Demand Side Response Monthly Net CSP Credits Day-Ahead Activity

ZONE	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
AE													
AEP													
APS								\$31,181	\$378,452	\$38,928	\$52,268	\$169,864	
BGE													
COMED								\$795					
DLCO								\$27,704					
DOM													
DPL	\$35,824		\$21,998	\$594		\$75,643	\$109,179	\$1,765,676	\$1,809,235	\$593,647		\$16,456	
JCPL													
METED													
PECO													
PENELEC													
PPL							\$7,812	\$29,384	\$10,550			\$3,145	
PSEG						\$8,815	\$40,669	\$41,152	\$44,494				
RECO													
Total	\$35,824	\$0	\$21,998	\$594	\$0	\$84,458	\$157,660	\$1,895,892	\$2,242,731	\$632,576	\$52,268	\$189,465	\$5,313,465



2005 Economic Demand Side Response

Monthly Net CSP Credits

Real-Time Activity

ZONE	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
AE	\$1,316					\$373	\$202,529	\$99,852					
AEP						\$13,548	\$62,126	\$28,931					
APS	\$230,431					\$168,362	\$681,722	\$240,348	\$468,212	\$431,546	\$210,290	\$65,090	
BGE						\$94,966	\$403,816	\$642,296	\$101,366	\$102,989		\$396,769	
COMED							\$82	\$1,341	\$2,596	\$500			
DLCO								\$132,134					
DOM								\$35,452					
DPL	\$135		\$60	\$333		\$20,970	\$728,182	\$42,087	\$8,898	\$67,780	\$19,123	\$8,270	
JCPL						\$2,393	\$6,784						
METED	\$2,585	\$293	\$5,357	\$1,647		\$9,215	\$15,734	\$531	\$1,196				
PECO			\$101			\$40,539	\$90,659	\$62,379	\$11,771	\$18,871	\$1,072	\$107	
PENELEC								\$1,503	\$2,192				
PPL	\$224	\$13,095			\$54,666	\$173,405	\$9,770	\$3,533	-\$4,868		\$79,063	\$29,324	
PSEG						\$464	\$8,224	\$6,510	\$963	\$17,052	\$19,331	\$70,362	
RECO								\$18	\$308				
Total	\$234,689	\$13,389	\$5,518	\$1,981	\$54,666	\$524,235	\$2,209,628	\$1,296,914	\$592,635	\$638,738	\$328,880	\$569,922	\$6,471,194



2005 Economic Demand Side Response Monthly MWh Reductions

ZONE	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
AE	16.6					2.3	2,336.1	1,122.8					
AEP						370.7	1,256.0	254.2					
APS	5,832.1					2,552.7	12,575.5	2,422.7	9,054.5	18,957.4	11,065.8	2,250.3	
BGE						650.1	1,762.6	3,748.1	885.8	1,119.1		2,952.2	
COMED							0.6	15.8	53.0	7.5			
DLCO								3,224.0					
DOM								348.0					
DPL	334.4		259.8	19.5		814.9	6,318.7	12,358.6	14,187.3	5,334.8	265.0	145.4	
JCPL						16.1	28.7						
METED	97.1	8.0	157.2	50.2		117.2	230.1	4.1	6.1				
PECO			1.1			300.0	484.1	362.6	77.1	135.5	18.8	0.6	
PENELEC								15.4	18.6				
PPL	29.9	632.5			1,538.7	2,354.3	192.6	198.1	86.4		1,129.1	853.9	
PSEG						71.3	350.9	320.4	286.8	123.8	204.3	699.1	
RECO								0.1	3.2				
Total	6,310.0	640.5	418.2	69.7	1,538.7	7,249.6	25,535.9	24,394.9	24,658.9	25,678.2	12,683.0	6,901.5	129,769.0



2004 and 2005 Total MWh Reductions and Total CSP Credits

Year	MWh of Reductions	Settled CSP Credits
2004	57,626	\$1,897,499.05
2005	113,392	\$11,231,678.96
Percent Difference over 2004	96.8%	491.9%

- Emergency Enhancements – endorsed by the Members Committee on September 29, 2005
- Ancillary Services – endorsed by the Members Committee on September 29, 2005
- Economic Load Response – Unanimously endorsed by the Members Committee on November 17, 2005
- All approved by FERC Feb. 2006.
- Implementation Q2, 2006.

Emergency Load Response enhanced:

- Preserves two options – energy only (voluntary) and energy and capacity (mandatory).
- Full Emergency Load Response made permanent.
- Expands aggregators of Full Emergency Load Response beyond LSEs to include CSPs.
- Aligns the deficiency charge more closely to the value of capacity as determined in PJM auctions.
- Allows demand resources to register simultaneously in Emergency and Economic Load Response.
- Links emergency payments to market prices with minimum dispatch price determined by resource not PJM.

Economic Load Response in the Energy Market:

- Permanent integration into the Energy Market (no longer a “Program”).
- Product rules largely unchanged from current.
- Treatment of incentive payments deferred until early 2007. Current sunset on 12/31/07.
- Pilot for non-interval metered customers enlarged and enhanced. Grants PJM flexibility to allow additional resources in.

New chance for demand side resources to provide synchronized (formerly spinning) reserves and regulation:

- Same payments as generators when resource is made available.
- Demand resources initially limited to 25% of synchronized reserve requirement.
- Additional training requirements for Curtailment Service Providers (CSPs)
- Endorsed by overwhelming majority of members.



Comparison of Revenue Opportunities for Demand Response Current vs. Revised

Revenue Opportunity	PJM (today)	PJM with new initiatives
Real-Time/Spot Energy Sales	Yes	Yes
Day-Ahead Energy Sales	Yes	Yes
Forward Energy Sales	No	Yes; Proposed Forward Energy Reserve Market
Forward Capacity Sales	Limited by small volume and to current planning year	Yes; Proposed RPM auction fixes problems
Energy & Capacity payment for emergencies	Not in all cases	Yes; Emergency program changes ensure payment
Ancillary Services	No	Yes; Spin & Regulation

- Demand response in electricity markets is underdeveloped
- Smart metering allows customers to see prices, respond to prices, and capture the market value of responding
- Evolving wholesale and retail electricity markets will require consumption to be measured on terms similar to production



Metered Data Requirements for Demand Response in PJM's Markets Vary

- Energy and Capacity – hourly integrated values provided within 60 days for settlement
- Synchronized Reserve – minute by minute during events provided by the next morning
- Regulation – same requirements as generation resources
- 500 MW Pilot for non-interval metered customers to evaluate new measurement and verification methodologies

Advantages of Demand Response participation for Federal facilities:

- Reliability
- Bill management
- Leading by example